

### REMARKS

The present application was filed on December 23, 1999 with claims 1 through 59. Claims 39-46 were cancelled in the Response to Office Action dated May 29, 2003, in response to an election requirement. Claims 12, 17, 22, 28, 37, 49, 52, 55 and 58 are proposed to be cancelled, without prejudice. Claims 1-11, 13-16, 18-21, 23-27, 29-36, 38, 47-48, 50-51, 53-54, 56-57, and 59 are presently pending in the above-identified patent application.

This amendment is submitted pursuant to 37 CFR §1.116 and should be entered. The Amendment places all of the pending claims in a form that is believed allowable, and, in any event, in a better form for appeal. It is believed that examination of the pending claims as amended, which are consistent with the previous record herein, will not place any substantial burden on the Examiner. Claims 25 and 30-35 are amended to correct typographical errors. No new matter is introduced and Applicants submit that a new search would not be required.

In the final Office Action, the Examiner rejected claims 1, 3, 5-12, and 47-49 under 35 U.S.C. § 102(e) as being anticipated by Zhong et al. (United States Patent Number 5,970,104) and rejected claims 24, 31-37, and 56-58 under 35 U.S.C. §103(a) as being unpatentable over Zhong et al. The Examiner also indicated that claims 13-23, 38, 50-55, and 59 are allowed and indicated that claims 2, 4, and 25-30 would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims.

#### Independent Claims 1, 24, 47, and 56

Independent claims 1 and 47 were rejected under 35 U.S.C. § 102(e) as being anticipated by Zhong et al. and claims 24 and 56 were rejected under 35 U.S.C. §103(a) as being unpatentable over Zhong et al.

Regarding claims 1, 24, 47, and 56, the Examiner maintains that Zhong discloses the precomputation of branch metrics for speculative sequences of channel symbols “in a fashion of ahead-of-time” and discloses that, “at a particular time, the state signal (121) is corresponding to a state from the ADD/COMPARE/SELECT (114), and is used to decide which branch indices are outputted from the BRANCH INDEX GENERATOR (112).”

First, as previously argued, Applicants maintain that Zhong does not disclose or suggest the *pre*computation of branch metrics. Rather, Zhong discloses a method to generate a branch metric table, but does not disclose the precomputation of this table ahead of time (e.g., it is not disclosed to precompute branch metrics for transitions from time step  $n$  to  $n+1$  already at time  $n$ -

1 or earlier, and it is also not disclosed to precompute branch metrics for combined transitions from time step  $n$  to time  $n+2$  already at time  $n-2$  (see col. 4, lines 13-28 and Fig. 2 in Zhong). In other words, while the Branch Metric Table may generate an output based on the current parallel data signals, it does *not* attempt to pre-compute branch metrics for future ACS decisions. As evidence of  
 5 the fact that Zhong does not precompute branch metrics, note that Zhong does not employ a pipeline register between the branch metric table 120 and the add-compare-select unit 140, which would be required to store precomputed branch metrics.

Second, contrary to the Examiner's assertion, Zhong does not disclose the precomputation of branch metrics for *speculative* sequences of channel symbols. In Zhong, 16  
 10 branch metrics are computed, and all branch metrics are used (see, e.g., col. 4, lines 55-62). The branch metric selection in Zhong *only* determines when each of the computed branch metrics is being used within one detection step. In the present invention, branch metrics for *speculative* sequences are precomputed, and only a subset of those are selected. These selected branch metrics correspond to actual survivor symbol sequences stored in the survivor memory unit. The other  
 15 speculative, non-selected branch metrics are not selected and are not used, as no corresponding survivor sequences exist in the survivor memory unit.

Zhong also does *not* disclose or suggest to select precomputed branch metrics based on a decision from a *corresponding state*. In Zhong, a state signal 121 is used by the branch index generator to generate the branch indices 118, which select the branch metrics. Zhong refers to the  
 20 signal 121 as a "state signal" (col. 3, line 9; col. 5, line 18) or bits {b2, b1} (Fig. 3b; col. 5, line 22; col. 5, line 47; col 6, line 19). Zhong does *not* disclose or suggest that signal 121 is a decision. On the other hand, Zhong refers to signal 110 as a "decision" (Fig. 1; col. 3, line 19), and Zhong also discloses that this "decision" 110 is a "survivor path decision" (col. 3, line 20), or that this decision is based on the output of the compare circuit, d0, of the add-compare select circuit (Fig. 5; col. 7,  
 25 lines 22-24). Clearly, Zhong does *not* disclose to select branch metrics based on the "decision" 110, as required by claim 1, and described in the present disclosure.

For the same reasons indicated above for the state signal, the branch indices 118 are *not* decisions as defined in Zhong and in the present invention.

Zhong also does not disclose or suggest to select branch metrics based on a signal  
 30 from a *corresponding state*. In Zhong, branch metrics are selected based on a *state signal*. In the present invention, however, branch metrics for a first state are *selected based on a decision from said*

*first state*, branch metrics for a second state are *selected based on a decision from said second state*, etc.

Regarding claim 24, Zhong does not disclose to precompute branch metrics for channels with memory, where the memory leads to intersymbol interference. Zhong's invention is for a channel *without memory*. The prior art would suggest to use a prefilter to completely eliminate the memory, i.e., the ISI would be completely canceled. Claim 24, however, discloses a precomputation technique for channels *with memory*. In claim 24, a prefilter is used to shorten the channel memory, and not to eliminate the channel memory. After the prefilter, there would still be ISI due to the shortened memory. Branch metrics are then precomputed for this shortened memory. The prefilter affects the performance of the branch metric precomputation and selection steps, as less branch metrics are precomputed, and branch metrics are precomputed for a different channel with shortened memory and different channel impulse response.

Independent claims 1 and 47 require *precomputing branch metrics for speculative sequences* of one or more channel symbols; and selecting one of said precomputed branch metrics based on at least one decision from at least one *corresponding state*. Independent claims 24 and 56 require *precomputing branch metrics for speculative sequences* of symbols that correspond to said *shortened channel memory*; and selecting one of said precomputed branch metrics based on at least one decision from at least one *corresponding state*.

Thus, Zhong et al. do not disclose or suggest precomputing branch metrics for speculative sequences of one or more channel symbols; and selecting one of said precomputed branch metrics based on at least one decision from at least one corresponding state, as required by independent claims 1 and 47, and do not disclose or suggest precomputing branch metrics for speculative sequences of symbols that correspond to said shortened channel memory; and selecting one of said precomputed branch metrics based on at least one decision from at least one corresponding state, as required by independent claims 24 and 56.

Dependent Claims 2-12, 14-17, 19-23, 25-37, 48-49, 51-52, 54-55, and 57-58

Dependent claims 3, 5-12, and 48-49 were rejected under 35 U.S.C. § 102(e) as being anticipated by Zhong et al. and claims 31-37, and 57-58 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Zhong et al.

Claims 2-11, 14-16, 19-21, 23, 25-27, 29-36, 48, 51, 54, and 57 are dependent on claims 1, 13, 18, 24, 47, 50, 53, and 56, respectively, and are therefore patentably distinguished over

Zhong et al. because of their dependency from independent claims 1, 13, 18, 24, 47, 50, 53, and 56 for the reasons set forth above, as well as other elements these claims add in combination to their base claim. The Examiner has already indicated that claims 14-16, 19-21, 23, 51, and 54 are allowed and indicated that claims 2, 4, 25-27, and 29-30 would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims.

With regard to claim 11, Zhong distinguishes between the state signal {b2, b1} "121", "survivor path decision" 110, and the data symbols in the path memory "123" (Fig. 1; col 3, lines 14-21). Zhong does not disclose the use of a survivor symbol from the "path memory" 123 to select a branch metric, as required by claim 11. Note that Zhong uses the term "path memory" for the block that is called survivor memory unit (SMU) in the present application.

#### Conclusion

All of the pending claims, i.e., claims 1-11, 13-16, 18-21, 23-27, 29-36, 38, 47-48, 50-51, 53-54, 56-57, and 59, are in condition for allowance and such favorable action is earnestly solicited.

If any outstanding issues remain, or if the Examiner has any further suggestions for expediting allowance of this application, the Examiner is invited to contact the undersigned at the telephone number indicated below.

The Examiner's attention to this matter is appreciated.

Respectfully submitted,



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